

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 15 NOV 2005

Applicant's or agent's file reference 88TY1311	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416	PCT
International application No. PCT/IB2004/003090	International filing date (day/month/year) 23.09.2004	Priority date (day/month/year) 25.09.2003		
International Patent Classification (IPC) or national classification and IPC B60C23/04, B60B23/04				
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.				

<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> <i>(sent to the applicant and to the International Bureau) a total of 6 sheets, as follows:</i></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> <i>(sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</i></p>
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>

Date of submission of the demand 21.03.2005	Date of completion of this report 11.11.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx; 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Billen, K Telephone No. +49 89 2399-7020



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/IB2004/003090

**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1-23 as originally filed

**Claims, Numbers**

1-24 filed with the demand

**Drawings, Sheets**

19-9/9 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

- The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):
- This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. IV Lack of unity of invention**

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1.  In response to the invitation to restrict or pay additional fees, the applicant has:
  - restricted the claims.
  - paid additional fees.
  - paid additional fees under protest.
  - neither restricted nor paid additional fees.
2.  This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
  - complied with.
  - not complied with for the following reasons:
4. Consequently, this report has been established in respect of the following parts of the international application:
  - all parts.
  - the parts relating to claims Nos. .

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-21
	No: Claims	22-24
Inventive step (IS)	Yes: Claims	1-21
	No: Claims	22-24
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Re Item IV**

IV.1 Document D4, which is considered to represent the most relevant state of the art, discloses a vehicle wheel information processing device comprising: a plurality of vehicle wheel communication devices (10) which are provided at a single vehicle wheel (col. 8, lines 62-65) and which are not connected to each other; and a vehicle body communication device (80) that communicates with the plurality of vehicle wheel communication devices; wherein a transmission pattern (Fig. 10) of a signal transmitted from each of the vehicle wheel communication devices (10) is set to be different to the transmission pattern of each other signal.

IV.2 When considering the cited prior art (D4) the following inventions, being characterized by their Special Technical Features (Rules 13(1) and 13(2) PCT) and making a contribution over this prior art and solving individual problems, can be identified:

**Invention I** (claims 1-12, 22-24)

The transmission patterns differ from each other in such a manner that signals of two or more vehicle wheel communication devices do not overlap each other, when requested at the same time.

**Invention II** (claims 13-21)

A second vehicle wheel communication device transmits an identification number for the second vehicle wheel communication device to the vehicle body communication device via the first vehicle wheel communication device.

Both inventions provide alternatives to avoid signal interference. The general problem of signal interference is known and a solution is given in prior art document D6.

Consequently, neither the objective problems underlying the subjects of each invention, nor their solutions defined by the technical features, allows for a relationship to be established between the said inventions, based on a single general

inventive concept.

Therefore, the 2 groups of claims are not linked by common or corresponding special technical features and thus define 2 different inventions not linked by a single general inventive concept.

The application does not therefore meet the requirement of Unity of Invention as defined in Rule 13(1) & 13(2) PCT.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**V.1 Prior Art**

Reference is made to the following documents:

- D1: GB-A-2 361 546
- D4: US-A-6 087 930
- D6: EP1336511 A1

**V.2 Independent Claims 1 and 13**

It appears that the subject-matter of claims 1 and 13 fulfils the requirements of Article 33(2) PCT.

**V.3 Claims 22-24**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter claims 22-24 is not new in the sense of Article 33(2) PCT.

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.  
**PCT/IB2004/003090**

D1 discloses a vehicle wheel information processing method comprising:

a plurality of vehicle wheel communication devices which are provided at a single vehicle wheel and not connected to each other ("Tread wear", "Tyre pressure", "Tyre temperature"; Fig. 8; page 15, lines 4-13); and  
a first step in which respective signals of each of the vehicle wheel communication devices are wirelessly transmitted to a vehicle body communication device (Fig. 8; "Vehicle mounted components antenna + transceiver circuitry") using a transmission pattern that is different for each vehicle wheel communication device (page 15, lines 4-15; each device has a fixed impedance providing a unique beat frequency); and  
a second step in which the respective signals wirelessly transmitted from each vehicle wheel communication device are received by the vehicle body communication device.

Further attention is drawn to document D4 showing a communication system wherein several wheel mounted transponders could be identified by an interrogator (col. 8; lines 63-65; Fig. 3-10).

Accordingly, the subject-matter of claims 22-24 lacks novelty.

The combination of the following method features is neither known from, nor rendered obvious by, the available prior art:

"a first step in which respective signals of each of the vehicle wheel communication devices are wirelessly transmitted to a vehicle body communication device using a transmission pattern that is different for each vehicle wheel communication device *in such a manner that the signals of two or more vehicle wheel communication devices do not overlap each other, when requested at the same time.*"

**Re Item VII**

**INTERNATIONAL PRELIMINARY  
REPORT ON PATENTABILITY  
(SEPARATE SHEET)**

International application No.

**PCT/IB2004/003090**

1. The features of the claims have not been provided with reference signs in parenthesis (Rule 6.2 b) PCT).
2. The Independent claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (D4) being placed in the preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
3. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1, D4 and D6 is not mentioned in the description, nor are these documents identified therein.

## CLAIMS:

1. A vehicle wheel information processing device comprising:

a plurality of vehicle wheel communication devices which are provided at a single vehicle wheel and which are not connected to each other; and

a vehicle body communication device that communicates wirelessly with the plurality of vehicle wheel communication devices, wherein

a transmission pattern of a signal transmitted from each of the vehicle wheel communication devices is set to be different to the transmission pattern of each other signal in such a manner that the signals of two or more vehicle wheel communication devices do not overlap each other, when requested at the same time.

2. The vehicle wheel information processing device according to claim 1,

15 wherein,

each vehicle wheel communication device comprises a detection sensor.

3. The vehicle wheel information processing device according to claim 1 or

20 claim 2, wherein

the plurality of vehicle wheel communication devices transmit the respective signals as respective return signals in response to a request signal from the vehicle body communication device.

25 4. The vehicle wheel information processing device according to claim 3,

wherein

a transmission start timing for the each return signal transmitted in response to the request signal is set to be different for each vehicle wheel communication device.

30

5. The vehicle wheel information processing device according to claim 3,  
wherein

each vehicle wheel communication device transmits the return signal

a plurality of times, and

a transmission cycle of each return signal is set to be different for each vehicle wheel communication device.

5 6. The vehicle wheel information processing device according to claim 3, wherein

each vehicle wheel communication device transmits the return signal a plurality of times, and

10 a transmission interval of each return signal is set at random such that the respective transmission intervals of the vehicle wheel communication devices are mutually different.

7. The vehicle wheel information processing device according to any one of claims 1 to 6, wherein

15 each signal having a individual identification number of the vehicle wheel communication device, the respective identification numbers for each of the vehicle wheel communication devices being mutually different, and

20 each vehicle wheel communication device transmits the signal including the identification number thereof to the vehicle body communication device.

the vehicle body communication device transmits a request signal including at least one of the identification numbers to the vehicle wheel communication devices, and

25 each of the vehicle wheel communication devices is configured to transmit a return signal to the vehicle body communication device in the case that its individual identification number is included within the received request signal, whereby the transmission pattern of the signal transmitted from each of the vehicle wheel communication devices is set 30 to be different to the transmission pattern of each other signal.

8. The vehicle wheel information processing device according to claim 5, wherein

the distinguishing characteristic is a data format of each signal transmitted from each vehicle wheel communication device, the data formats of the respective signals transmitted from each vehicle wheel communication device being mutually different.

5

9. The vehicle wheel information processing device according to claim 5, wherein

the distinguishing characteristic is a magnitude of a value of each signal transmitted from the each vehicle wheel communication device, the 10 respective magnitudes of the values of the respective signals transmitted from each vehicle wheel communication device being mutually different based upon an attachment position of each vehicle wheel communication device, and

the vehicle body communication device analyzes the values of the 15 signals transmitted from the respective vehicle wheel communication devices, and determines which of the signals has been transmitted from which of the vehicle wheel communication devices based upon the analysis.

20 10. The vehicle wheel information processing device according to claim 9, wherein

each vehicle wheel communication device comprises an sensor

each vehicle wheel communication device transmits a value detected by the sensor

25 the vehicle body communication device determines which of the signals has been transmitted from which of the vehicle wheel communication devices based upon the detected values transmitted from a plurality of vehicle wheel communication devices.

30 11. The vehicle wheel information processing device according to claim 9 or claim 10, wherein

the vehicle body communication device analyses a history of each value of each signal transmitted from each vehicle wheel communication

device, and determines which of the signals has been transmitted from which of the vehicle wheel communication devices based upon the analysis.

5 12. The vehicle wheel information processing device according to claim 9 or claim 10, wherein

the vehicle body communication device analyses the magnitude of each value of each signal transmitted from each vehicle wheel communication device, and determines which of the signals has been transmitted from which of the vehicle wheel communication devices based upon the analysis.

10 13. A vehicle wheel information processing device comprising:

15 a plurality of vehicle wheel communication devices which are provided at a single vehicle wheel; and

each vehicle wheel communication device comprises a sensor,

a vehicle body communication device that communicates with the plurality of vehicle wheel communication devices, wherein

20 the plurality of vehicle wheel communication devices include a first vehicle wheel communication device that directly and wirelessly communicates with the vehicle body communication device, and a second vehicle wheel communication device that wirelessly communicates with the first vehicle wheel communication device and indirectly communicates with the vehicle body communication device by using the first vehicle

25 wheel communication device as a relay,

the first vehicle wheel communication device transmits an identification number for the first vehicle wheel communication device to the vehicle body communication device,

30 the second vehicle wheel communication device transmits an identification number for the second vehicle wheel communication device to the vehicle body communication device via the first vehicle wheel communication device.

14. The vehicle wheel information processing device according to claim 13, wherein

each vehicle wheel communication device transmits a value detected

5 by the sensor,

the vehicle body communication device determines which of the signals has been transmitted from which of the vehicle wheel communication devices based upon the detected values transmitted from a plurality of vehicle wheel communication devices.

10

15. The vehicle wheel information processing device according to claim 13, wherein

a transmission pattern of the signal transmitted from the first vehicle wheel communication device is different from a transmission pattern of the signal transmitted from the second vehicle wheel communication device.

20 16. The vehicle wheel information processing device according to claim 13, wherein

the first vehicle wheel communication device transmits the signal at a transmission cycle which is different from a transmission cycle at which the second vehicle wheel communication device transmits the signal.

25 17. The vehicle wheel information processing device according to any one of claims 13 to 16, wherein

the single wheel is provided with a first detection sensor that detects first vehicle wheel information, and a second detection sensor that detects second vehicle wheel information, the first detection sensor being included in the first vehicle wheel communication device, and the second detection 30 sensor being included in the second vehicle wheel communication device.

18. The vehicle wheel information processing device according to claim 17, wherein

22. A vehicle wheel information processing method for receiving and processing vehicle wheel information from a plurality of vehicle wheel communication devices provided at a single wheel and not connected to each other, the method comprising:

5 a first step in which respective signals of each of the vehicle wheel communication devices are wirelessly transmitted to a vehicle body communication device using a transmission pattern that is different for each vehicle wheel communication device; and

10 a second step in which the respective signals wirelessly transmitted from each vehicle wheel communication device are received by the vehicle body communication device.

23. The method according to claim 22, further comprising:

15 a third step in which a request signal from the vehicle body communication device is transmitted to the vehicle wheel communication devices, wherein

each vehicle wheel communication device transmits the signal in response to the request signal.

20

24. The method according to claim 22 or 23, further comprising:

a fourth step in which the vehicle body communication device determines which of the signals has been transmitted from which of vehicle wheel communication devices based on the respective  
25 transmission patterns.